

1. Introduction

This traffic impact analysis is for the construction of a Wal-Mart Supercenter store and associated outlots located in Carlinville, IL. Carlinville, population 5,685 (2000 US Census), is located approximately 50 miles southwest of Springfield, IL, at the junction of Illinois Route 108 and Illinois Route 4. The new store is planned to have approximately 104,939 SF of retail space. The Wal-Mart will be located on the southwest side of Carlinville on the southeast corner of Shipman Blacktop and Loveless Parkway. This intersection, which will serve the vast majority of the Wal-Mart traffic, is currently an unsignalized three-legged intersection. The proposed West Entrance will form a four-legged unsignalized intersection with Loveless Parkway forming the east and west legs while an entrance to a senior housing development will constitute the north leg. The proposed East Entrance will form a three-legged intersection with Loveless Parkway. The intersection of Illinois Route 108 and Shipman Blacktop is approximately one mile north of the proposed site in Carlinville. It currently is unsignalized and has severe capacity deficiencies. The intersection of Illinois Route 108 and Chiles St. is approximately 270' west of the intersection at Shipman Blacktop. The close proximity of the two intersections requires the analysis of the two intersections as one coordinated system.

1.1 Purpose of Report

The purpose of this study is:

1. To determine what effects traffic generated by the proposed store will have on the existing and proposed road network. This analysis will determine if the road network will be sufficient to accommodate the increased traffic.
2. To make conclusions in determining if modifications are required to the surrounding road network as a direct result of Wal-Mart construction.
3. To make recommendations addressing roadway system improvements that will accommodate higher traffic volumes. The improvements will aid access to and from the site.

1.2 Study Objectives

The objectives for this analysis include the following:

1. Estimate the number of new trips that will be generated by the Wal-Mart Supercenter and outlots associated with the proposed development.
2. Distribute the generated traffic from each parcel associated with the Wal-Mart onto the public roadway system based on existing population density and traffic patterns.
3. Assign the generated traffic volumes to the entrances and roadways that will serve as access points to the site.

4. Prepare a capacity and level of service analysis for each intersection included in the study for the following scenarios:
 - 2006, 2026, No Wal-Mart Development – Analyze existing and future traffic, including background growth, in the AM and PM Peak Hours assuming Wal-Mart development does not occur.
 - 2006, 2026, Wal-Mart site development – Analyze current and future traffic, including all development associated with Wal-Mart. All site work will be assumed completed in the base year 2006.
5. Prepare a traffic impact analysis using all relevant site information and traffic data to provide a safe and efficient driving environment.

2. Study Area Conditions

2.1 Area Roadway System

Existing (2006) and future conditions (2026) with and without Wal-Mart were both analyzed in this report. The study area includes the following intersections:

- Illinois Route 108 and Shipman Blacktop
- Illinois Route 108 and Chiles Street
- Shipman Blacktop and Loveless Parkway
- Loveless Parkway and the West Entrance
- Loveless Parkway and the East Entrance

A map of the study area in the City of Carlinville is provided in **Figure 1**.

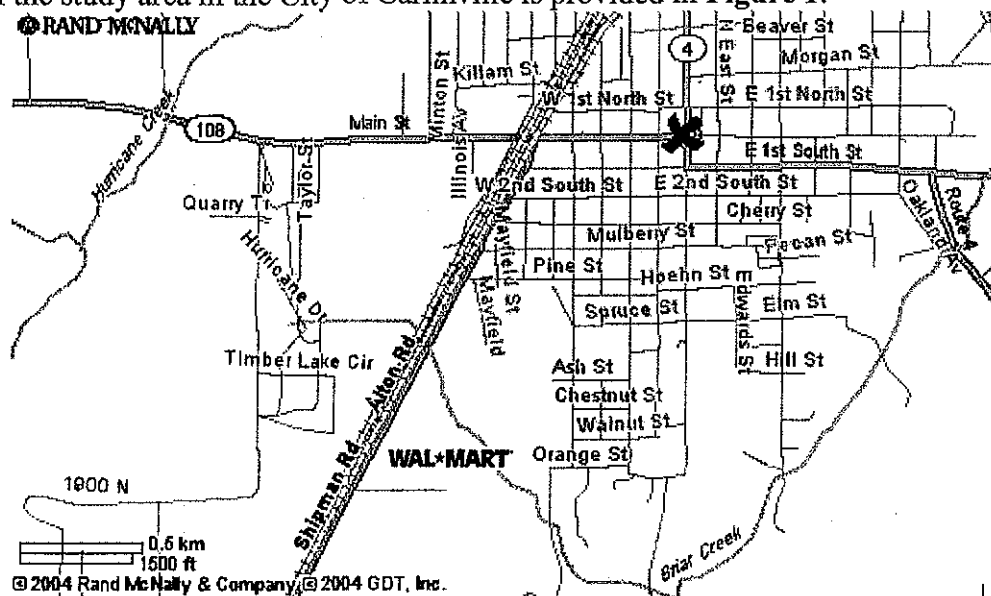


Figure 1 – Site Location, Carlinville, IL

2.2 Description of the Study Intersections

Illinois Route 108 and Shipman Blacktop – This existing intersection is currently a three-legged stop-controlled intersection. The east-west leg is Illinois Route 108 and the south leg is Shipman Blacktop. The south leg is stop-controlled. The eastbound and westbound approaches have one marked lane each. However, the westbound approach is wide enough so that it essentially functions as a left turn lane and a thru lane. The northbound approach has one shared left turn/right turn lane. There is a railroad crossing approximately 100' west of the center of the intersection and the intersection at Chiles St. is approximately 170' beyond that.

Illinois Route 108 and Chiles Street – This existing intersection is currently a four-legged stop-controlled intersection. The east-west leg is Illinois Route 108 and the north-south leg is Chiles Street. The north and south legs are stop-controlled. The eastbound and westbound approaches have one exclusive left turn lane and one shared thru/right turn lane each. The northbound and southbound approaches each have one shared left/thru/right turn lane. There is a railroad crossing approximately 170' east of the center of the intersection and the intersection at Shipman Blacktop is approximately 100' beyond that.

Shipman Blacktop and Loveless Parkway – This existing intersection is currently a three-legged stop-controlled intersection. The northbound approach has one thru/right turn lane and the southbound approach has one shared thru/left turn lane. The westbound approach has one shared left/right turn lane.

Loveless Parkway and West Entrance – This proposed four-legged intersection will be approximately 420' east of Shipman Blacktop and will serve as the main entrance to the Wal-Mart development. The West Entrance will be aligned with an entrance to a senior housing development on the opposite side of Loveless Pkwy. The westbound approach will likely have one shared left/thru/right turn lane. The eastbound approach is anticipated to have one thru/left turn lane and one right turn lane. The northbound approach will have one left turn lane and one thru/right turn lane.

Loveless Parkway and East Entrance – This proposed three-legged intersection will be approximately 360' east of the West Entrance and will serve primarily delivery trucks. It is anticipated that every leg will provide one lane in each direction.

2.3 Existing Traffic Volumes and Conditions

Illinois Route 108 is Main St. in Carlinville and serves as the primary east-west route through the city. It varies between two lanes and three lanes. Shipman Blacktop is a two lane highway with aggregate shoulders. To the south of the site, Shipman Blacktop tapers out to three lanes at an intersection with a school entrance south of Loveless Parkway. Loveless Parkway is a minor two lane local road.

Traffic counts performed in 2004 by CMT project that, after a growth factor has been applied, the following average daily traffic (ADT) volumes exist in 2005. The DHV has been determined by assuming that the bi-directional traffic on the roadway in the peak hour is 10% of the ADT. A map showing the ADTs near the proposed site can be found on **Exhibit B-1**.

- Illinois Route 108, west of Shipman –11,200 vehicles per day
- Illinois Route 108, east of Shipman –11,600 vehicles per day
- Shipman Blacktop, north of Loveless Pkwy. – 5,500 vehicles per day
- Shipman Blacktop, south of Loveless Pkwy. – 5,700 vehicles per day
- Loveless Parkway, east of Shipman Blacktop – 340 vehicles per day
- Chiles St., north of Illinois Route 108 – 750 vehicles per day

2.4 Existing Land Uses

The land that the proposed Wal-Mart development shall be built on is currently used for agriculture. There is an elementary school to the south of the property on Shipman Blacktop and a sports complex and residential housing to the east on Loveless Pkwy. For the purposes of this study, it is assumed that there are no further plans for development in the vicinity of the proposed site during the 20-year analysis period. Any development not associated with Wal-Mart should be considered incidental and part of traffic background growth.

The proposed Wal-Mart parcel has a total land area of 30.8 acres. One additional commercial parcel, a gas station, will be situated on 0.5 acres. The preliminary site plan is shown on **Exhibit A-1**. For the purposes of this report, the gas station will be functioning by base year analysis in 2006.

2.5 Anticipated or Approved Future Development

For the purposes of this report, no other anticipated large-scale developments in the base year of 2006 near Wal-Mart are assumed. This does not, however, preclude additional improvements or modifications to other roads near the study area should development not included in this study occur.

3. Traffic Data

3.1 Site Traffic

Peak hour traffic volumes were developed from traffic counts performed by CMT in November 2004 and April 2005 at the study intersections. The peak hour volume data can be found in **Appendix A**.

It is possible that actual traffic growth may differ from any assumptions made in this report. In addition, network changes such as other large-scale development in and around the site could change traffic flow patterns as outlined here.

3.2 Trip Generation

The amount of traffic generated by the proposed Wal-Mart and associated outlots can be considered a function of land use and development size. Due to the unique characteristics of Wal-Mart Supercenters, a study was conducted by Kimley-Horne and Associates, Inc., heretofore called the "Wal-Mart Trip Characteristics Study", to determine trip generation and trip types for both the Supercenter and the gas station sites. The results of this study can be found in **Appendix A**. According to the ITE Trip Generation Handbook local data should be used, if available, in place of data presented in the Trip Generation Report¹. The Trip Generation Report and the "Wal-Mart Trip Characteristics Study" present an established compilation of trip data for various land uses in studies performed across the United States². This enables the analyst to determine generation rates comparable to previously constructed sites with similar characteristics when local or established trip generation data is not available.

While the "Wal-Mart Trip Characteristics Study" provides a trip generation rate of 4.52 vehicle trips per 1,000 SF of floor area in the PM Peak Hour for the Wal-Mart Supercenter and 15.6 vehicle trips per fuel position for the gas station, there is no information concerning what percentage of these trips are entering and exiting. Also, this study deals exclusively with the PM Peak Hour. To fill in the missing information, the ITE Trip Generation Handbook was used. Trip generation data for a Free-Standing Discount Superstore in the ITE Trip Generation Handbook (Land Use Code 813) shows that the vehicle trips generated during the AM peak of the adjacent roadway is 47.5% of the trips generated during the PM Peak Hour of the adjacent roadway. The ITE Trip Generation Handbook also shows that a gasoline station (Land Use Code 944) generates vehicle trips during the AM peak of the adjacent roadway that is 80% of the trips generated during the PM Peak Hour of the adjacent roadway. These percentages were used in determining the trips generated in the AM Peak Hour. **Table 1** summarizes the site-generated trip data for the new Wal-Mart development with an assumed build out in the year 2006.

¹ ITE Trip Generation Handbook, Institute of Transportation Engineers, Second Edition, 2004.

² Trip Generation, Institute of Transportation Engineers, Seventh Edition, 2004.

Table 1 – Generated Trips for Proposed Development

	Land Use	ITE Code	Size	AM Enter (Trips)	AM Exit (Trips)	PM Enter (Trips)	PM Exit (Trips)
Wal-Mart Supercenter	Retail	N/A	99,700 SF	110	115	232	242
Gas Station	Retail	N/A	16 fuel positions	100	100	125	125
Internal Capture				-56	-56	-70	-70
Total Trip Generation				154	159	287	297
Pass-by Trips				-51	-52	-70	-73
Diverted-Link Trips				-40	-41	-66	-69

There is no mass transit system in Carlinville, so for the sake of this analysis it will be assumed that all customers will access the site in their own vehicles.

3.2.1 Internal Capture Trips

Internal capture trips result when a trip is made between two of the land uses within a development without using the outside road system. Internal trips are common in multi-use developments such as a strip mall or discount superstore that shares parking lots with other businesses. Since this development is part of a multi-use facility, it was appropriate to account for internal trips. Data from the “Wal-Mart Trip Characteristics Study” was used to determine the number of internal trips.

According to the ITE Trip Generation Handbook, the internal capture rate for a given area is a function of what kind of development is encompassed within the study. In this analysis, all developments associated with the Wal-Mart are commercial properties. The internal capture rate for the developments in this study was determined from data presented in the “Wal-Mart Trip Characteristics Study” and engineering judgment. According to the study, 56% of trips generated by the gas station should be considered part of the internal capture. The Wal-Mart itself is not considered a secondary destination in this analysis, so no trips are subtracted from the Wal-Mart total as internally captured. Consequently, the internal capture trips listed in **Table 1** is based on the number of trips generated by the gas station.

3.2.2 Pass-by Trips

According to the ITE Trip Generation Handbook, pass-by trips are made as intermediate stops on the way from an origin to a primary trip destination without a route diversion³. They are attracted from traffic passing the proposed site on an adjacent street that offers direct access to the development. As such, pass-by trips are not added to traffic directly

³ ITE Trip Generation Handbook, Institute of Transportation Engineers, Second Edition, 2004.

generated by the site in question, as they would be on the road network if the site did not exist. According to the "Wal-Mart Trip Characteristics Study", pass-by trips account for 24.5% of trips generated by the Wal-Mart and 24.0% of trips generated by the gas station. Pass-by trips in this case are diverted from Shipman Blacktop and Loveless Parkway.

3.2.3 Diverted Link Trips

According to the ITE Trip Generation Handbook, diverted link trips are trips that are attracted from volume on roadways near the generator but not adjacent to it⁴. These trips could require multiple diversions to gain access to the site. A good example in this study would be traffic attracted to the site from the westbound Illinois Route 108 thru volume. Diverted link trips add volume to streets directly adjacent to a site, but may not significantly add traffic to other major routes in the area. According to the "Wal-Mart Trip Characteristics Study", diverted link trips account for 25.8% of trips generated by the Wal-Mart and 12.0% of trips generated by the gas station. All diverted link trips in this study will be diverted from Illinois Route 108.

3.3 Trip Distribution

3.3.1 New Trip Distribution Methodology

The method used to distribute traffic generated by the proposed development to and from various destinations shall be described as follows:

1. With the use of traffic data in this report, traffic shall be assumed to travel according to the direction of greatest traffic flow along neighboring streets.
2. To determine the volume of traffic added to the surrounding road network, the generated traffic shall be distributed by direction at their intersection with the public road. Distribution shall be based on existing population density and traffic patterns.

3.3.2 New Trip Distribution Assumptions

According to the proposed site plan, there will be two entrances to the Wal-Mart site off of Loveless Parkway on the north side of the site. The West Entrance will serve as the main entrance to the development while the East Entrance will serve primarily delivery trucks.

A proposed site plan can be found in **Appendix A**. The percentages of entering and exiting vehicles for each land use were taken from the ITE Trip Generation Report. A summary of the traffic distribution is as follows:

⁴ Ibid.

- The distribution of traffic entering into and departing from the site is based off of existing population distribution. The City of Carlinville lies north and east of the site, providing the majority of the generated traffic. There are a number of minor streets intersecting with Shipman Blacktop between Illinois Route 108 and Loveless Parkway. This accounts for the fact that the percentage of traffic from the north does not equal the percentage of traffic from the north that uses Illinois Route 108. Vehicles considered “new trips” entering the study area in 2006 are distributed as follows:
 - To/From the north on Shipman Blacktop – 90%
 - To/From the south on Shipman Blacktop – 8%
 - To/From the east on Loveless Parkway – 2%
 - To/From the east on Illinois Route 108 – 65%
 - To/From the west on Illinois Route 108 – 13%
 - To/From the north on Chiles Street – 2%
- It was assumed that the population distribution would not change over time based upon growth in surrounding areas. Vehicles in 2026 are assumed to be distributed the same as in 2006.

3.3.3 Pass-By Trip Distribution

As previously mentioned, results from the “Wal-Mart Trip Characteristics Study” were used to determine the percentage of pass-by trips. Land uses where trip duration is only a few minutes, such as a gas station or fast food restaurant with a drive-through window, tend to have higher pass-by percentages than land uses where dwell time is much longer, such as a supermarket or discount retailer.

The distribution of pass-by trips entering into and departing from the site is based on the existing traffic flow that currently passes the site entrance. Vehicles considered “pass-by trips” entering and exiting the site are distributed as follows:

- From the north, departing to the south on Shipman Blacktop – AM - 44%
- From the south, departing to the north on Shipman Blacktop – AM - 56%
- From the north, departing to the south on Shipman Blacktop – PM - 53%
- From the south, departing to the north on Shipman Blacktop – PM - 47%

3.3.4 Diverted Link Trip Distribution

As discussed previously, results from the “Wal-Mart Trip Characteristics Study” were used to determine the percentage of the trips generated by the development that are diverted from the traffic that already exists on the study intersections that does not pass the proposed site, i.e. traffic that travels west through the intersection of Illinois Route

108 and Shipman Blacktop. As was the case for pass-by trips, land uses that have short trip durations have higher diverted trip percentages.

The number of Diverted Link trips can be found in **Table 1**. The distribution of diverted link trips entering into and departing from the site is based on the existing traffic that passes through the Illinois Route 108 & Shipman Rd. intersection. Diverted-link trips leave the site and proceed in the direction of their original destination. The distribution of diverted-link trip sources is as follows:

- Westbound thru movements – **AM - 56%**
- Eastbound thru movements – **AM - 44%**

- Westbound thru movements – **PM - 56%**
- Eastbound thru movements – **PM - 44%**

3.4 Trip Assignment

The following assumptions, based on existing traffic patterns, were made regarding traffic assignment associated with Wal-Mart construction.

1. 95% of new trips coming from the west on Loveless Parkway will make a right turn into the West Entrance while the remaining 5% will make a right turn into the East Entrance.
2. 70% of new trips originating from the east on Loveless Parkway will make a left turn into the West Entrance while the remaining 30% will make a left turn into the East Entrance.

From the distribution assumptions listed in Section 3.3, trips were assigned to the network intersections for the years 2006 and 2026 for the PM Peak Hour. The network volumes associated with the Wal-Mart site development can be found in **Appendix B**.

3.5 Peak Hour

The peak hour for the Wal-Mart intersections and the outside street system may be different from one another. Typical values of peak hour factors range from 0.80 to 0.95 for higher speed roads and urban/suburban intersections. For this traffic analysis, a Peak Hour Factor of 0.90 was used.

The typical PM Peak Hour is between 4PM and 6PM, however, the low volume of existing traffic on Shipman Blacktop combined with the traffic associated with the existing school south of the site makes the peak hour from 2:45PM to 3:45PM. Typically this would not be considered the peak hour of the development, but for the sake of being

conservative this time period was analyzed as the PM Peak Hour of the intersection of Shipman Blacktop & Loveless Parkway in this report.

3.6 Roadway Historical Growth Rate

An Intersection Design Study performed for the school entrance to the south of the proposed development and approved by IDOT used a yearly growth factor of 1.0%. This factor was used in determining future traffic growth in this traffic impact analysis.

3.7 Total Future Traffic

3.7.1 No-Build Condition

The no-build traffic condition includes only existing traffic plus background growth. The no-build traffic volumes at the study intersections were derived from traffic counts performed by CMT in 2004 and 2005. This scenario assumes no development in the immediate vicinity of the proposed Wal-Mart. The peak hour volumes can be found in **Figures B-2 thru B-5**. Details from this analysis using the 2000 Highway Capacity Software (HCS) can be found in **Appendix C**.

3.7.2 Build Condition, With Wal-Mart

The build condition traffic in this scenario includes development of the Wal-Mart property and the outlots, plus existing and forecasted background traffic growth in both 2006 and 2026. Existing volumes plus the growth factor are added to the total Wal-Mart site generated volume. This traffic assignment can be found in **Figures B-6 thru B-9**. The HCS 2000 analyses for this scenario can be found in **Appendix D**.

4. Capacity Analysis

The quality of service at an intersection is based on its ability to accommodate traffic that passes through in a timely and efficient manner. Efficiency is described in terms of Level of Service (LOS). The LOS rating system describes the operational characteristics of a particular intersection or roadway and ranges from A (free flow, minimal delay) to F (extreme congestion, unacceptable delay).

LOS is determined by the average control delay (in seconds per vehicle) of all vehicles entering the intersection. Average control delay is based on the peak 15-minute interval of the peak hour analyzed. Control delay is considered to be the stopped time a vehicle experiences plus the time lost due to acceleration and deceleration. Since control delay is an average value, some approaches could experience much greater delay than other approaches. Intersections that have low control delays have a high level of service; in contrast, intersections that have high control delays have a low level of service.

According to the *Highway Capacity Manual*, LOS E is considered to be the limit of acceptable delay while LOS F often indicates the need for intersection improvements.

LOS characteristics and criteria are slightly different for unsignalized and signalized intersections. Drivers anticipate longer delays at signalized intersections, which can carry a higher volume of traffic. In addition, there are a number of driver considerations that can affect how much delay one experiences. For example, a driver is able to relax at a red light and proceed when the light changes. A driver at an unsignalized intersection does not have the ability to passively wait, as he/she must constantly be attentive for an acceptable gap for entry onto the main street. In addition, the amount of delay a driver experiences at an unsignalized intersection can vary widely from situation to situation, often much more than at signalized intersections. LOS is only calculated for legs of an intersection that must yield to other movements at unsignalized intersections. Table 2 describes Level of Service and criteria for signalized and unsignalized intersections.

Table 2 – Level of Service Characteristics from 2000 HCM

<u>LOS</u>	<u>Signalized Intersections</u>	<u>Unsignalized Intersections</u>
A	Describes operations with very low delay, less than or equal to 10.0 sec/veh. This occurs when progression is extremely favorable and most vehicles arrive during the green phase.	Describes operations with very low levels of delay that average less than 10 sec/veh.
B	Describes operations with delay in the range of 10.1 to 20.0 sec/veh. This condition generally occurs with good progression, short cycle length or both.	Describes operations with low levels of delay in the range of 10.1 to 15.0 sec/veh.
C	Describes operations with delay in the range of 20.1 to 35.0 sec/veh. Individual cycle failures may occur, though many vehicles still pass through unimpeded.	Describes operations with average delays in the range of 15.1 to 25.0 sec/veh.
D	Describes operations with delay in the range of 35.1 to 55.0 sec/veh. The influence of congestion becomes more noticeable. Longer delays may result from unfavorable progression, longer cycle lengths, or both.	Describes operations with average delays in the range of 25.1 to 35.0 sec/veh. The influence of congestion becomes more noticeable.
E	Describes operations with delay in the range of 55.1 to 80 sec/veh. Individual cycle failures are common occurrences. This LOS is considered to be the limit of acceptable delay by most agencies.	Describes operations with average delays in the range of 35.1 to 50.0 sec/veh.
F	Describes operations with delay greater than 80.0 sec/veh. This level is considered to be unacceptable to most drivers and often occurs when vehicles entering the intersection exceed the capacity.	Describes operations with average delay greater than 50.0 sec/veh. LOS F exists where insufficient gaps exist so vehicles can enter the dominant traffic stream. Large queuing on side streets is common.

4.1 Capacity Analyses Scenarios

An evaluation of the proposed new development must include both the existing traffic volumes plus traffic generated by the new Wal-Mart. Such an evaluation determines the adequacy of the surrounding road network to handle the increased traffic. Recommendations can be formulated from the analyses to improve the traffic flow such that delay is minimized within economic feasibility.

Evaluations have been made for the peak hours for each of the intersections in the study for the following scenarios:

1. Existing Traffic Without Proposed Development + Background Traffic Growth (2006, 2026) – **Figures B-2 thru B-5** are summaries of these traffic volumes at Illinois Route 108 & Shipman Blacktop and Shipman Blacktop & Loveless Parkway during the AM and PM Peak Hours.
2. Existing Traffic + Background Traffic Growth + Wal-Mart Generated Traffic Volumes (2006, 2026) – **Figures B-6 thru B-9** are summaries of these traffic volumes at the study locations during the AM and PM Peak Hours. This analysis assumes a 100% build out in the year 2006 for the entire Wal-Mart development.

The analyses were completed using HCS-2000, an established macroscopic traffic analysis software based off of the Highway Capacity Manual, 2000 edition. The computer solutions showing control delay and Level of Service (LOS) are included in **Appendices C and D. Tables 3 and 4** summarize the control delay and LOS for intersections with and without Wal-Mart development. While HCS-2000 was used to analyze the study intersections individually, the close proximity of the intersections along Illinois Route 108 at Shipman Blacktop and Chiles Street required analyzing them together. To do so, Synchro 6, an established macroscopic traffic analysis software deemed acceptable by the Illinois Department of Transportation, was used to determine the appropriate cycle lengths, phasing, and timing to ensure that the two intersections functioned properly together. The timing and phasing shown in the HCS analyses for the two intersections along Illinois Route 108 were derived from coordinated analyses performed using Synchro 6.

Table 3 – Overall Intersection Delay and LOS, AM Peak Hour

Delay is in seconds per vehicle; (LOS) is in parenthesis.

Intersection	2006	2006	2026	2026
	No Wal-Mart	w/ Wal-Mart	No Wal-Mart	w/ Wal-Mart
IL Route 108 & Shipman Blacktop	86.6 (F)**	10.7 (B)	405.5 (F)**	11.6 (B)
IL Route 108 & Chiles Street	34.5 (D)**	9.3 (A)	95.3 (F)**	9.8 (A)
Shipman Blacktop & Loveless Pkwy.	12.8 (B)*	8.0 (A)	14.5 (B)*	8.2 (A)
Loveless Pkwy. & West Entrance	N/A	9.7 (A)**	N/A	9.7 (A)**
Loveless Pkwy. & East Entrance	N/A	8.7 (A)*	N/A	8.8 (A)*

* Indicates unsignalized intersection, delay is given for stopped approach.

** Indicates unsignalized intersection, delay is given for critical stopped approach.

Table 4 – Overall Intersection Delay and LOS, PM Peak Hour

Delay is in seconds per vehicle; (LOS) is in parenthesis.

Intersection	2006	2006	2026	2026
	No Wal-Mart	w/ Wal-Mart	No Wal-Mart	w/ Wal-Mart
IL Route 108 & Shipman Blacktop	63.5 (F)**	12.4 (B)	255.7 (F)**	18.2 (B)
IL Route 108 & Chiles Street	35.0 (D)**	10.5 (B)	89.8 (F)**	10.6 (B)
Shipman Blacktop & Loveless Pkwy.	10.3 (B)*	9.1 (A)	11.0 (B)*	9.3 (A)
Loveless Pkwy. & West Entrance	N/A	11.3 (B)**	N/A	11.6 (B)**
Loveless Pkwy. & East Entrance	N/A	8.9 (A)*	N/A	9.0 (A)*

* Indicates unsignalized intersection, delay is given for stopped approach.

** Indicates unsignalized intersection, delay is given for critical stopped approach.

HCS-2000 was also used to determine queue lengths with development on key approaches for both signalized and unsignalized intersections. The rationale for this analysis serves two purposes. First, it shows the 95th percentile queue length that can be expected on individual approaches. The 95th percentile queue length details a representation of the network under conditions that would likely produce a maximum queue length. This analysis can be used to determine if vehicles will sit in long queues that will back up into other intersections on a given route. This is a potential concern when signals are placed less than 1000' feet apart on a road with significant traffic volumes. Second, a queue length analysis can be used to determine the adequacy of left and right turn bay storage. This is valid at both signalized and unsignalized intersections.

Table 4 summarizes the 95th percentile queue length (in feet) for all movements at Illinois Route 108 & Shipman Blacktop, Shipman Blacktop & Loveless Pkwy, and Loveless Pkwy. & the West Entrance.

The analyzed intersections were considered for signalization if they met the 2000 Manual on Uniform Traffic Control Devices (MUTCD) guidelines for signal warrants⁵. Unsignalized intersection delays are given for relevant approach streets only.

Table 5 – Queue Lengths, With Wal-Mart

Intersection	2006 AM	2026 AM	2006 PM	2026 PM
Illinois Rte. 108 & Shipman Blacktop, EB left/thru/right turn	207'	259'	207'	426'
Illinois Rte. 108 & Shipman Blacktop, WB left turn	67'	52'	81'	88'
Illinois Rte. 108 & Shipman Blacktop, WB thru/right turn	201'	169'	163'	201'
Illinois Rte. 108 & Shipman Blacktop, NB left turn/thru	81'	92'	110'	132'
Illinois Rte. 108 & Shipman Blacktop, NB right turn	126'	109'	185'	162'
Illinois Rte. 108 & Chiles St., EB left turn	26'	29'	16'	18'
Illinois Rte. 108 & Chiles St., EB thru/right turn	185'	212'	245'	284'
Illinois Rte. 108 & Chiles St., WB left turn	2'	2'	5'	5'
Illinois Rte. 108 & Chiles St., WB thru/right turn	238'	268'	255'	289'
Illinois Rte. 108 & Chiles St., SB left/thru/right turn	68'	86'	63'	87'
Shipman Blacktop and Loveless Parkway, NB thru	129'	155'	69'	88'
Shipman Blacktop and Loveless Parkway, NB right turn	8'	8'	11'	12'
Shipman Blacktop and Loveless Parkway, SB left turn	32'	32'	109'	112'
Shipman Blacktop and Loveless Parkway, SB thru	65'	80'	58'	74'
Shipman Blacktop and Loveless Parkway, WB left turn	26'	30'	33'	34'
Shipman Blacktop and Loveless Parkway, WB right turn	64'	65'	100'	101'
Loveless Parkway and West Entrance, NB left turn	16'	28'	16'	41'
Loveless Parkway and West Entrance, NB thru/right turn	1'	1'	1'	1'

This analysis shows that the projected EB PM Peak Hour vehicle queue at Illinois Route 108 and Shipman Blacktop is in excess of 400' in 2026. Also, at the Chiles St. intersection in 2026, the WB PM Peak Hour vehicle queue is approximately 290'. These queues will conflict with the adjacent intersection since the two intersections are approximately 270' apart. The location of the existing railroad crossing, approximately 100' west of the Shipman Blacktop intersection, and right of way restrictions precludes widening the road or the construction of a right turn lane to reduce the projected queue length. Also, the presence of the railroad crossing further reduces the storage length

⁵ Manual on Uniform Traffic Control Devices, Federal Highway Administration, 2000.

between intersections since queued vehicles should not stop on the railroad tracks. This unfavorable situation leads to the best alternative being to install warning signs to motorists not to block the intersections.

At the intersection of Shipman Blacktop and Loveless Parkway, it is recommended that the southbound left turn lane be constructed per IDOT's guidelines for flush channelized islands at isolated rural intersections. This design will be consistent with the approach on Shipman Rd. at the school entrance to the south of Loveless Parkway. See **Appendices C and D** for individual intersection approaches for each analyzed scenario.

5. Traffic Signal Warrant Analysis

There are eight warrants in the 2000 MUTCD regarding appropriate use of traffic signals. The satisfaction of a single warrant, however, does not itself justify the installation of a signal. Engineering studies should indicate that the placement of a signal would significantly impact the operational characteristics and safety of the intersection in a positive way. Warrants in the MUTCD include eight-hour vehicular volume, four-hour vehicular volume, peak hour volume, pedestrian volume, school crossings, coordinated signal systems, crash experience, and roadway network.

The existing intersections of Illinois Route 108 & Shipman Blacktop and Illinois Route 108 & Chiles St. currently satisfy Warrants #2 and #3. Signalization is recommended at these locations with or without construction of the proposed Wal-Mart. The intersections close proximity to each other and the presence of the railroad crossing makes interconnection imperative.

The intersection of Shipman Blacktop and Loveless Parkway is expected to meet Warrant #2 in 2006 and 2026 and Warrant #3 in 2026. Signalization is recommended at this location upon site build out in 2006. The intersections of the West and East Entrances with Loveless Parkway do not meet any signalization warrants and should be stop-controlled.

It is important to note that the analyses performed make a number of assumptions regarding location of future development. Hence, any of the unsignalized intersections in this study may meet additional warrants for signalization at any time in the 20-year design period if proposed site development differs substantially from what has been assumed in this report.

6. Improvements to Accommodate Site Traffic

A number of site improvements at each of the intersections were assumed in performing the analyses included in this report. The improvements are recommended to improve

traffic flow, accommodate the needs of vehicle accessibility, and maintain a high degree of safety. They include the following:

- In order to signalize the intersection, the west entrance of the business located on the north side of the intersection should be converted to an exit only driveway and serve as the north leg of the signalized intersection, while the east entrance of this business will be converted to an entrance only driveway. The northbound approach needs to be widened to provide an exclusive right turn lane and a shared thru/left turn lane. The existing westbound approach should be restriped as an exclusive left turn lane and a shared thru/right turn lane. The proposed traffic signals should be interconnected to the existing railroad warning system to ensure that queued vehicles can clear the railroad tracks when necessary.

In conjunction with the signalization of Illinois Route 108 and Shipman Blacktop, the intersection of Illinois Route 108 and Chiles Street should also be signalized. These signals will be interconnected with the railroad warning system and the signals at Shipman Blacktop.

- The intersection of Shipman Blacktop & Loveless Parkway should be signalized to better accommodate the projected traffic upon site buildout and bicycle and pedestrian traffic on the existing bike path. In addition to signalization, Shipman Blacktop should be widened to accommodate the addition of a southbound left turn lane and a northbound right turn lane. Loveless Parkway should also be widened so that the westbound approach provides exclusive left turn and right turn lanes.
- At the intersection of Loveless Parkway and the West Wal-Mart Entrance, an eastbound right turn lane is recommended so as to make it easier for northbound left turns to differentiate between vehicles turning right into the entrance and thru vehicles continuing through the intersection. Otherwise, uncertainty about which vehicles present conflicts and those that don't will lead to delay and safety issues. Also, a pedestrian crosswalk should be painted across the east leg to accommodate pedestrians accessing the site from the senior housing development on the north side of Loveless Parkway. Signs instructing motorists to stop for pedestrians should be installed and necessary sidewalks constructed as part of this improvement.

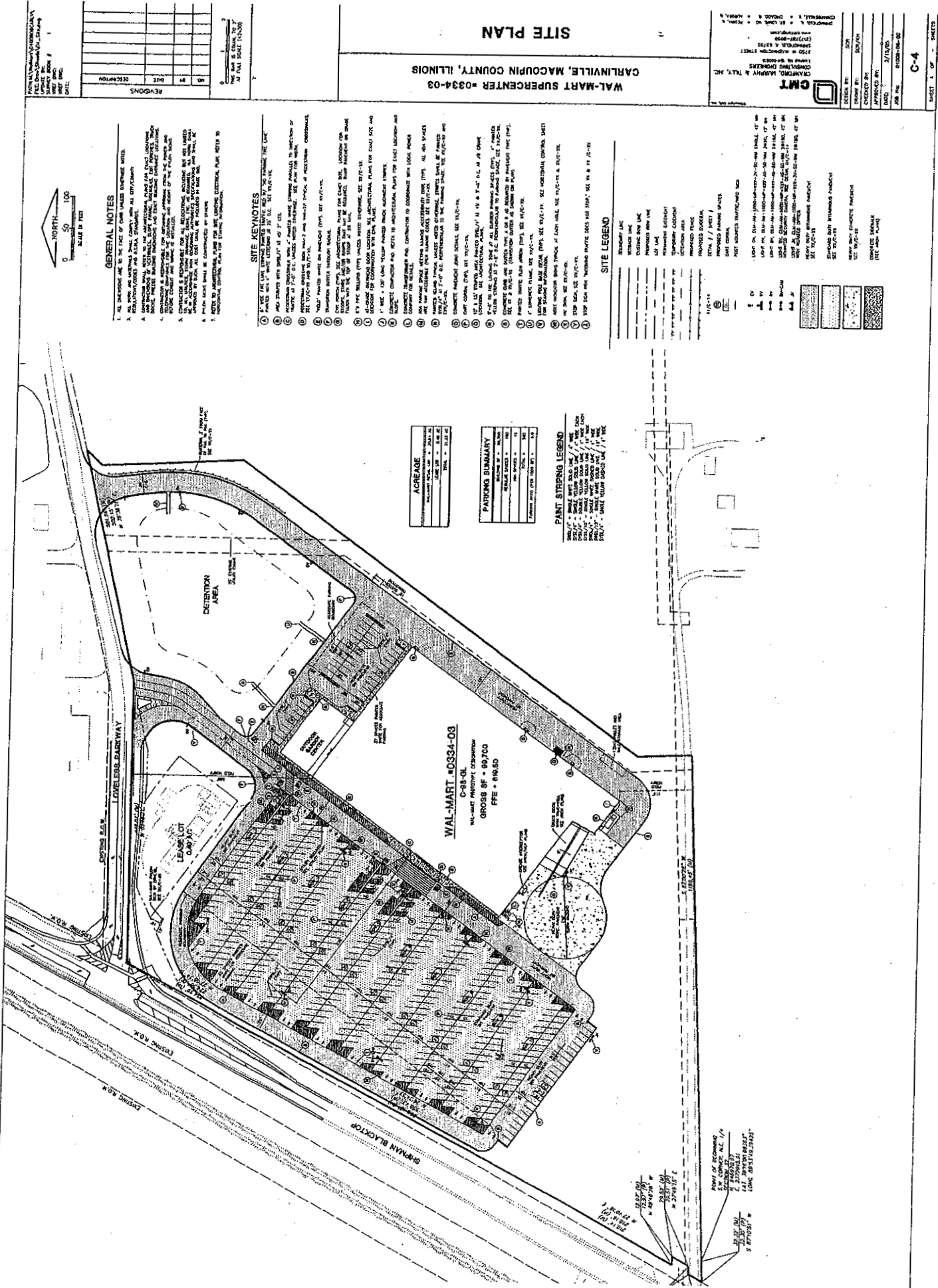
7. Conclusions

From this analysis, various conclusions can be drawn about the construction of a Wal-Mart Supercenter in Carlinville, IL. These conclusions can be summarized as follows:

- The intersection of Illinois Route 108 and Shipman Blacktop is currently unsignalized and has severe capacity deficiencies. In order to signalize the intersection, the west entrance of the business located on the north side of the

Appendix A

Preliminary Site Plan	A-1
Illinois Route 108-Shipman Road Intersection.....	A-2
Traffic Development Worksheet.....	A-3
Trip Generation Data, Wal-Mart.....	A-4
Traffic Volume Data – Illinois Route 108 & Shipman Blacktop.	A-5
Traffic Volume Data – Illinois Route 108 & Chiles Street.	A-6
Traffic Volume Data – Shipman Blacktop & Loveless Parkway.....	A-7



GENERAL NOTES

1. ALL DIMENSIONS ARE TO THE FACE OF CURB UNLESS OTHERWISE NOTED.
2. ALL UTILITIES ARE TO BE LOCATED AND DEPTHS DETERMINED PRIOR TO CONSTRUCTION.
3. ALL UTILITIES ARE TO BE DEPTHS DETERMINED PRIOR TO CONSTRUCTION.
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10. ALL UTILITIES ARE TO BE DEPTHS DETERMINED PRIOR TO CONSTRUCTION.

SITE KEYNOTES

1. THE SITE IS TO BE DEVELOPED FOR A WAL-MART SUPERCENTER.
2. THE SITE IS TO BE DEVELOPED FOR A WAL-MART SUPERCENTER.
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10. THE SITE IS TO BE DEVELOPED FOR A WAL-MART SUPERCENTER.

SITE LEGEND

- 1. DRIVE AISLE
- 2. DRIVE AISLE
- 3. DRIVE AISLE
- 4. DRIVE AISLE
- 5. DRIVE AISLE
- 6. DRIVE AISLE
- 7. DRIVE AISLE
- 8. DRIVE AISLE
- 9. DRIVE AISLE
- 10. DRIVE AISLE

PARKING SUMMARY

TYPE	AREA (SQ. FT.)	AREA (SQ. YD.)
ASPHALT	10,000	727
GRAVEL	10,000	727
TOTAL	20,000	1,454

PANT STRENGTH LEGEND

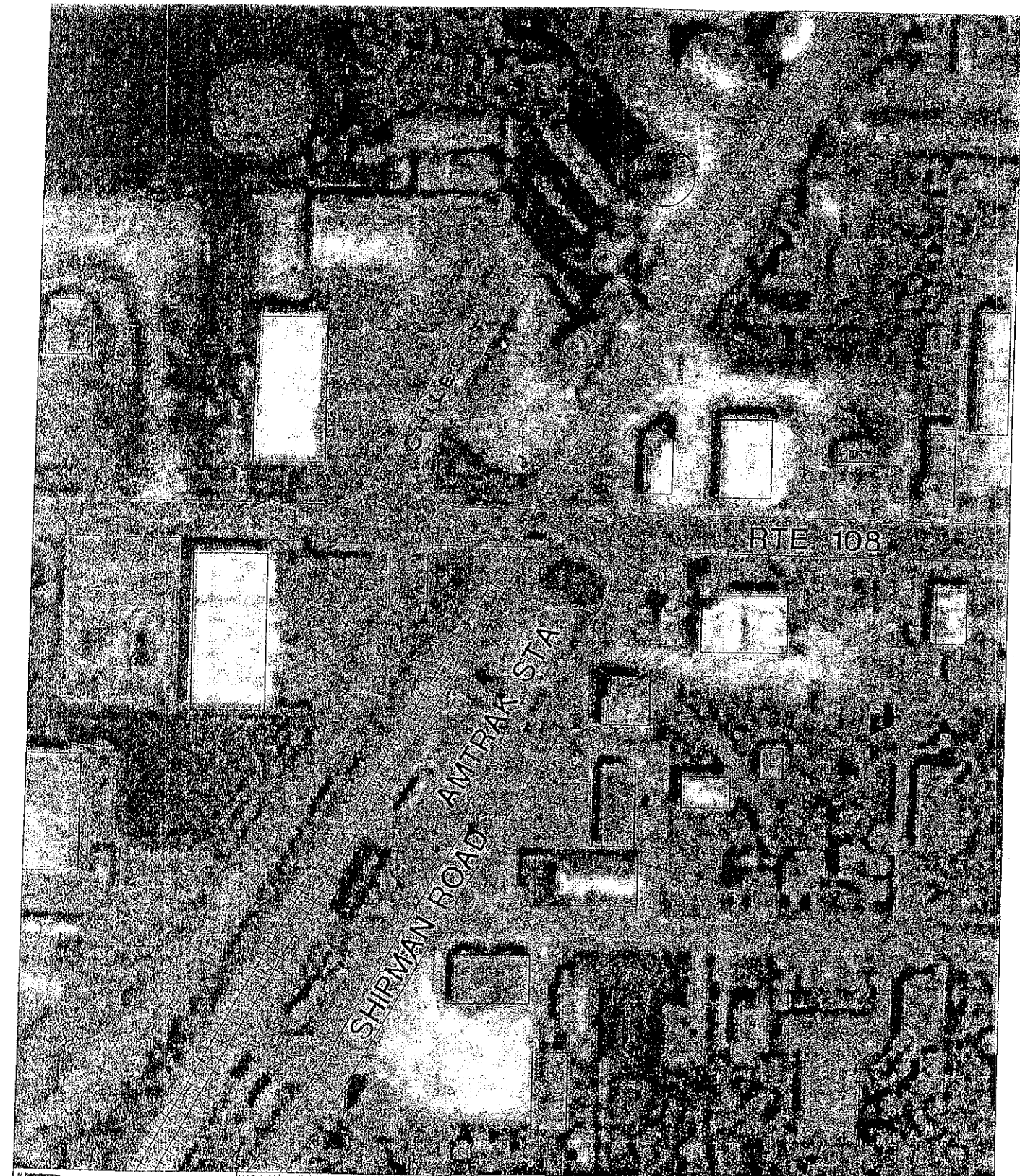
- 1. 1/2" MIN. THICKNESS
- 2. 1/2" MIN. THICKNESS
- 3. 1/2" MIN. THICKNESS
- 4. 1/2" MIN. THICKNESS
- 5. 1/2" MIN. THICKNESS
- 6. 1/2" MIN. THICKNESS
- 7. 1/2" MIN. THICKNESS
- 8. 1/2" MIN. THICKNESS
- 9. 1/2" MIN. THICKNESS
- 10. 1/2" MIN. THICKNESS


REVISIONS

NO.	DATE	DESCRIPTION
1	01/15/03	ISSUED FOR PERMIT
2	02/15/03	REVISED FOR COMMENTS
3	03/15/03	REVISED FOR COMMENTS
4	04/15/03	REVISED FOR COMMENTS
5	05/15/03	REVISED FOR COMMENTS

CMT

CONTRACT NO. 0334-03
SHEET 1 OF 1
DATE: 01/15/03
DRAWN BY: J. J. J.
CHECKED BY: J. J. J.
APPROVED BY: J. J. J.
SCALE: 1" = 40'



 CMT <small>CONCRETE, METAL & TIE, INC. 10001 E. 115th Street Chicago, IL 60655</small> <small>1752 N. WASHINGTON STREET CHICAGO, IL 60642 (312) 767-0050 www.cmtinc.com</small>	<small>© Copyright CMT, Inc.</small> PATH: M:\WM\0400900\Draw\EXHIBIT\ FILE: TRFC-EXHIBIT.DWG UPDATE BY: SURVEY BOOK # XREF DWG: XREF DWG: DATE:	WAL-MART SUPERCENTER #0199-04 CARLINVILLE, ILLINOIS	DESIGN BY: AOO DRAWN BY: RCE CHECKED BY: APPROVED BY:																	
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